

SILVER

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Silver was mined in more than 40 countries in 2002. The producing countries are listed in table 8. Mexico was the leading silver producer in 2002, followed by Peru, China, and Australia. The United States retained its fifth place position despite a sharp decrease in production.

The photography and electronics industries remained the leading domestic markets for silver products in 2002. The photography industry accounted for 47% of domestic consumption; electrical and electronics, 27%; jewelry and silverware, 10%; coins and medallions, 10%; and others, 6%.

U.S. imports for consumption increased substantially compared with those of 2001. Mexico (50%) was the leading source of imported silver to the United States, followed by Canada (33%) and Peru (4%).

For the fourth consecutive year, the difference in the high and low prices of silver was less than \$1 per troy ounce. In 2002, the average annual silver price increased by more than 5% to \$4.62 per ounce. Despite this modest increase, silver prices remained historically low. Except for 2001, the average price has not been lower since 1993.

Legislation and Government Programs

The U.S. Mint is responsible for safeguarding a significant portion of the Nation's stocks of precious metals and is the custodian of most of its silver. The value of the stocks is reported at the lower of cost or market value. Amounts and values of custodial silver in the custody of the Mint on September 30, 2002, were 220,062 kilograms (kg) of silver with a market value of \$32.068 million (at \$4.5325 per fine troy ounce) and a statutory value of \$9.148 million. A statutory rate of \$1.29292 per fine troy ounce was used to value the custodial silver held by the Mint (U.S. Mint, undated¹).

The Mint sold 342,239 kg of silver American Eagle bullion coins—its second year of highest sales in the history of the program. In addition, 10,450 kg of gold bullion and 1,190 kg of platinum bullion were sold. The Mint was able to continue producing its American Eagle silver bullion products due to passage of the Support of the American Eagle Silver Bullion Program Act. The Act authorizes the Secretary of the U.S. Department of the Treasury to purchase silver on the open market because the Defense Logistics Agency's strategic and critical materials silver stockpile has been depleted.

Periodically, the U.S. Congress considers proposed amendments to the General Mining Law of 1872, as amended, which governs mining claims and related activities on Federal lands. In 2002, there was no significant activity with respect to mining law reform in Congress.

Production

In 2002, silver production was reported in the United States from precious-metal ores at about 24 lode mines and from base-metal ores at 20 lode mines. More than 30 metric tons (t) of silver was produced at each of 11 mines; their aggregated production equaled about 85% of total domestic output. Fewer than 10 placer operations produced silver in 2002, and the quantity produced was less than 1% of total domestic production.

Domestic mine production of silver, which totaled 1,420 t, was down sharply in 2002 compared with production in 2001 (table 1). The 18% decline was the second consecutive drop in mine output and has taken mine production to its lowest level since 1994. Most of the drop in output can be attributed to the closure of Echo Bay Mines Ltd.'s McCoy/Cove gold mine in Nevada. Production at the mine, which had been a major producer in previous years, was discontinued on March 31, 2002, and the mine site is now being reclaimed. In 2002, silver production at McCoy/Cove was down 78% from production in 2001. There was also a significant reduction in byproduct silver generated at copper mines. For instance, output at Kennecott Utah Copper Corp.'s Bingham Canyon Mine was 25,000 kg lower than in 2001. Reductions at Bingham Canyon were accompanied by cutbacks at ASARCO Incorporated's Mission Mine in Arizona. Weak demand and low copper prices were the reasons most often cited as motivation for the cutbacks. There was also evidence of production curtailments in response to low metal prices. For example, mining activity at the Lucky Friday Mine in Idaho, operated by Hecla Mining Company, was reduced by 50% during 2002. This resulted in output of only 62,400 kg in 2002, 38% lower than output in 2001. Output of silver at the Greens Creek Mine in Alaska was down by 0.5% to 101,056 kg in 2002 from 101,536 kg in 2001. The decrease was due to lower grade ore and could have been greater, but the company milled 11% more ore than in 2001. Greens Creek is a joint-venture arrangement among Hecla (29.73%) and Kennecott Minerals wholly owned subsidiaries Kennecott Greens Creek Mining Company (the manager of the mine) and Kennecott Juneau Mining Company. The Greens Creek Mine is a polymetallic deposit containing silver, zinc, gold, and lead (Hecla Mining Company, 2003, p. 20-26).

¹References that include a section mark (§) are found in the Internet References Cited section.

Meanwhile, silver output at the Red Dog Mine in Alaska increased by more than 20% compared with 2001. Increased output at the Red Dog Mine combined with production at the Greens Creek Mine made Alaska the leading U.S. silver producer in 2002, surpassing Nevada for the first time.

Consumption

Silver, the least expensive of the precious metals, is the whitest and has the highest electrical and thermal conductivity of all the metals. These and other unique properties are the basis for its use as catalysts, in electronics, jewelry, photography, and silverware.

In 2002, world silver demand exceeded supply by about 1,560 t, the 14th consecutive year of supply deficit. During this time period, 50,000 t of silver has been drawn out of reported and undisclosed inventories to make up for the shortfall.

Domestic silver demand remained strong in 2002, primarily because of its industrial applications. Despite increased competition from digital cameras, silver halides still provide enhanced quality in both film and photographs, and silver use in photography continued to grow. Use of silver in the U.S. photographic industry totaled 2,046 t in 2002, an increase of 4% when compared with 2001. As the whitest of all precious metals, silver still had significant use as historic storage of wealth in jewelry, coinage, and silverware. Silver fabrication (470 t) in this sector increased by about 5%. Because silver does not spark when subjected to an electrical charge, its use in electronics and wiring as a solder is important in electrical contacts. The most significant uses of silver in electronics were in the preparation of thick-film silver-palladium pastes for use as silkscreen circuit paths in multilayer ceramic capacitors, in the manufacture of membrane switches, in silver film for electrically heated automobile windshields, and in conductive adhesives. Domestic fabrication demand in this sector was about 1,170 t in 2002, an increase of about 10%. Other uses consumed about 1,400 t of silver in solders, bearings, chemical catalysts used to make basic feedstock for polyethylene, mirrors, antibacterial agents, dental alloys, and other applications. Another 341 t of silver was used in the making of silver bullion coins, which were purchased by investors. The silver used to mint coins was counted as separate from fabrication products because the coins are “bullion like” and are purchased for their silver content (Silver Institute, 2003, p. 75-83).

Prices

With the exception of 14 days in June and July, the price of silver traded below \$5 per ounce. The high for 2002 was registered on June 4 and July 15 at \$5.15 per ounce, \$0.76 above the average 2001 price. After making an interim low of \$4.34 in October, the price rose steadily higher in the fourth quarter, closing at \$4.79 per ounce in a yearend recovery. The average for 2002 was \$4.62 per ounce, \$0.23 above the 2001 average. The 2002 average, however, was still below the 10-year average of \$4.95 per ounce. Through April 2003, the average was \$4.66 per ounce.

Trade

Domestic silver supply was estimated to be 6,600 t in 2002. The largest component of this was made up of imported silver bullion, doré, silver metal, and other silver compounds totaling 4,700 t, which was 1,760 t more than in 2001. After large speculative deliveries were made to a U.S.-based investment company in March 1998, the United States returned to its historic pattern as a net importer of silver in 1999. In 2002, exports totaled only 624 t, 12% less than in 2001. Net imports of refined silver were about 3,980 t in 2002. Recovery from scrap was estimated to be about 1,030 t, 3% less than in 2001. Domestic mine supply was 1,420 t. Most mine supply was a byproduct of base-metal and gold operations. Less than 10% of total silver supply came from mines whose main metal was silver.

World Review

Despite increased output from Australia, Canada, Mexico, and Peru, silver mine production was essentially unchanged in 2002. While the Silver Institute (2003) reported a slight decline in world output, the U.S. Geological Survey reported a small increase in production. The difference in the two sets of data was probably due to differences in how production data from the reporting countries were interpreted. Although the actual decline in production reported by the Silver Institute was less than 1%, it represented the first reported drop in mine output since 1994.

Chile.—Silver production in Chile was about the same as in 2001 at 1,350 t. Reduced silver production from copper and gold mines was more than offset by production at the Cerro Bayo gold/silver mine. The Cerro Bayo property covers about 103 square miles and is south of Coihaique, the capital of region XI in southern Chile. Construction of two ramps to intersect the high-grade Lucero vein in the Cerro Bayo deposit began in November 2001 and was completed in February 2002. Additional mineralized high-grade gold and silver vein systems—the Luz Eliana, Celia, Soledad East, and Andrea—were discovered in addition to a mineralized loop in the main Lucero vein. Operations officially started in April, and by the end of the year, the mine had produced 97 t of silver (Coeur d’Alene Mines Corp., 2003, p. 13-14).

China.—For decades, China had one of the larger government silver inventories owing to discontinued use of silver in coinage. It now appears that most of this silver has been sold. How much silver remains in Government stockpiles is a state secret. Many observers believe that very little is left in government inventories. Others believe that China still has one of the larger inventories of silver held by a National Government. With improvements in the economy, liberalized gold and silver markets, lower labor costs, and

relatively liberal government environmental regulations and laws, there have been large imports of silver-rich concentrates into the Chinese refining market. The Chinese Government is expected to continue disposing of its silver stocks, but it appears that much of the silver being exported from China represents newly refined metal from these imported base-metal concentrates.

As the Chinese photography market has modernized, it has relied more on imports of silver nitrate. These imports have displaced domestically refined silver from scrap. The displaced silver refined from scrap was exported.

Mexico.—Silver output was essentially unchanged at about 2,748 t. Closures and reduced output from several operations in the country were offset by increased production at Industrias Peñoles, S.A. de C.V., Mexico's leading silver producer. Peñoles produced record levels of silver and other metals, in part owing to the first full year of operations at Francisco I. Madero (41 t), the startup in February of the expanded Sabinas mining unit, the April startup of La Herradura's third leaching pad, and process improvements at the Fresnillo Mine. Output at Fresnillo, one of the world's most productive silver mines, increased by 9% to 972 t (Industrias Peñoles, S.A. de C.V., undated\$).

Peru.—Peru's silver output increased by 14% to 2,687 t. A major portion of the increase was attributed to the polymetallic Antamina Mine, which started production in October 2001. The mine accounted for 190 t of silver, a 58% increase compared with 2001 production. In its first full year of operation, Pan American Silver Corp.'s Huron Mine produced 141 t of silver, an increase of 52 t compared with 2001. In addition, the Yanacocha Mine increased its output by 23% to 58 t. The increase was the result of higher ore grades and mining rates at the mine and extra output from the new Quinua deposit (Pan American Silver Corp., 2003; Silver Institute, 2003, p. 22-23).

Current Research and Technology

Silver-Sputtered Polyester Film Has High Reflectance.—A polyester film that is coated with silver and then bonded to a metal coil has been developed for high-reflectance applications. The material is made in two steps. First, a thin layer of pure silver is deposited onto a clear polyester film via magnetron sputtered vacuum deposition, a process that provides an excellent metal-to-film adhesion. The film is then permanently bonded to coils of steel or aluminum by means of a coil-coating process based on a thermoset, cross-linked adhesive system. The film is chemically bonded to the metal, creating a bond so strong that it eliminates the possibility of delamination, bend cracking, crazing, and forming restrictions. A possible use of the material is in tubular skylight applications in which a roof-mounted dome collects natural light and directs it down a highly reflective cylinder of the material to a light diffuser in the room ceiling. Such units are typically offered in diameters of 25.4 centimeters (cm), 35.5 cm, and 40.6 cm, with recommended tube lengths up to 457 cm. The amount of light provided by a 25.4 cm solar tube reportedly is comparable to the amount of light from a 61-cm square skylight, and the amount of light from a 40.6 cm tube is comparable to the amount from a skylight that is 61 cm by 122 cm (Advanced Materials & Processes, 2002).

Environment-Friendly Photography.—A new type of photographic system, acid amplification imaging (AAI), employs a single sheet coated with layers containing all the chemical compounds needed to create and develop a fixed image. The film captures a latent image consisting of a primary acid that forms in regions exposed to visible light. Heating the film generates a larger amount of a secondary acid that combines with indicator dyes to form a permanent image. Conventional silver halide photography either uses process solutions into which the silver salts are extracted or uses two-sheet media in which one of the sheets—the sheet that contains the residual silver—is discarded. The AAI system uses a single sheet that can be exposed to light and developed using a thermal process that does not require the addition and removal of chemical reagents to develop and fix the image. Possible applications of the new film include digital printing of transparent or reflective images and in situ formation of color filters for liquid-crystal displays (Chemical & Engineering News, 2002).

Outlook

About 75% of annual silver use is in photography, and this end use sector is being threatened by the growth of digital photography. Silver use in photography fell for the third consecutive year. Although the decline has been partially owing to economic weakness and the reduction in tourism in the United States, digital photography continues to cut into silver's share of the photography market. In 2002, sales of digital cameras increased by 20%, compared with a modest decrease in sales of conventional cameras. In the medium term, it appears that the impact of digital technology on the demand for silver will continue to grow, affecting demand not only for photographic films, but also for graphic arts paper, medical x-ray film, and motion picture film. The cost per pixel for digital cameras has fallen dramatically during the past decade, which translates to less expensive cameras with improved picture quality.

In the long term, several potential growth areas exist for silver. For example, silver can be used in superconductors, in which a silver metal sheath is wrapped around the core superconducting material. The silver sheath increases the efficiency of the superconductive wire, reducing resistive power losses during transmission. The more efficient transmission of power is a concern owing to increasing costs of electricity and rising demand for electricity worldwide. Research is ongoing into the development of antifouling paints for watercraft, to replace copper antifouling paint that is toxic to marine life. Along the same lines, there is research into silver wood preservatives, to replace the more toxic arsenic-based wood preservatives.

Fuel cells offer a long-term option for power generation and motor vehicles. Currently, fuel cell development for use in motor vehicles is centered on proton exchange membrane (PEM) cells and alkaline-based cells. While the most promising research is focused on platinum-based fuel cells, alkaline-based cells are also of interest because they have technical and cost advantages compared with PEM cells, including the ability to use nonplatinum catalysts, such as gold or silver. The U.S. Government recently

proposed legislation that provides for a federally funded 3-year study on the use of gold and silver as catalysts for automotive and industrial uses.

As for supply and demand, little speculative buying was apparent during the fourth quarter, in contrast to earlier quarters in 2002. However, strong physical buying can be expected at current silver prices because mine supply of silver decreased in 2002 for the first time in 6 years, and it is expected to decrease again in 2003. In addition, it appears that for the time being, China has curtailed sales from its silver inventories. These supply and demand fundamentals provide a solid base for current prices and good support for higher prices in the near term.

References Cited

Advanced Materials & Processes, 2002, Silver-sputtered polyester film has high reflectance: Advanced Materials & Processes, v. 160, no. 11, November, p. 14.
Chemical & Engineering News, 2002, Getting silver out of photos: Chemical & Engineering News, v. 80, no. 32, August 12, p. 11.
Coeur d'Alene Mines Corp., 2003, Form 10-K—2002: Securities and Exchange Commission, 117 p.
Hecla Mining Company, 2003, Form 10-K—2002: Securities and Exchange Commission, 128 p.
Pan American Silver Corp., 2003, 2002 year end operations update: Vancouver, British Columbia, Canada, Pan American Silver Corp. news release, February 20, 2 p.
Silver Institute, 2003, World silver survey 2003: Silver Institute, May, 87 p.

Internet References Cited

Industrias Peñoles, S.A. de C.V., [undated], 2002 annual report, accessed August 6, 2003, via URL <http://www.penoles.com.mx>.
U.S. Mint, [undated], 2002 annual report, accessed July 22, 2003, via URL <http://www.usmint.gov>.

GENERAL SOURCES OF INFORMATION

U.S. Geological Survey Publications

1998 Assessment of Undiscovered Deposits of Gold, Silver, Copper, Lead, and Zinc in the United States. Circular 1178, 2000.
Precious Metals. Mineral Industry Surveys, monthly.
Silver. Ch. in Mineral Commodity Summaries, annual.
Silver. Ch. in United States Mineral Resources, Professional Paper 820, 1973.

Other

Antaike Precious & Minor Metal Monthly, 2002-2003.
Silver. Ch. in Mineral Facts and Problems, U.S. Bureau of Mines Bulletin 675, 1985.

TABLE 1
SALIENT SILVER STATISTICS¹

		1998	1999	2000	2001	2002
United States:						
Mine production:						
Quantity	metric tons	2,060	1,950	1,980	1,740	1,420
Value	thousands	\$368,000	\$329,000	\$318,000	\$245,000	\$211,000
Refinery production:						
Domestic and foreign ores and concentrates	metric tons	2,300	2,000	2,780	2,640	2,580
Scrap (old and new)	do.	1,700	1,500	1,680	1,060	1,030
Exports, refined	do.	2,250	481	279	707	624
Imports for consumption, refined	do.	2,800	2,660	3,810	2,940	4,600
Stocks, December 31:						
Industry	do.	400	NA	462	360	280
Futures exchanges	do.	2,360	2,490	2,920	3,250	3,290
Department of the Treasury	do.	582	617	220	220	220
National Defense Stockpile	do.	1,030	778	458	21	--
Price, average ²	dollars per troy ounce	\$5.54	\$5.25	\$5.00	\$4.39	\$4.62
Employment, mine and mill workers ³		1,550	1,500	1,200	1,100	1,100
World, mine production	metric tons	17,200	17,600 ^r	18,400 ^r	19,300 ^r	20,000 ^e

^eEstimated. ^rRevised. NA Not available. -- Zero.

¹Data are rounded to no more than three significant digits, except prices.

²Price data are the annual Handy & Harman quotations published in Platts Metals Week.

³Employment data are from the Mine Safety and Health Administration.

TABLE 2
MINE PRODUCTION OF SILVER IN THE UNITED STATES, BY STATE¹

(Kilograms)

State	2000	2001	2002
Arizona	W	W	W
California	8,390	7,590	3,400
Colorado	3,200	2,830	W
Idaho	W	W	W
Nevada	734,000	544,000	424,000
South Dakota	W	W	W
Washington	1,560	--	--
Other ²	1,240,000	1,180,000	994,000
Total	1,980,000	1,740,000	1,420,000

W Withheld to avoid disclosing company proprietary data, included with "Other." -- Zero.

¹Data are rounded to no more than three significant digits; may not add to totals shown.

²Includes Alaska, Missouri, Montana, New Mexico, Utah, and States indicated by symbol W.

TABLE 3
LEADING SILVER-PRODUCING MINES IN THE UNITED STATES IN 2002, IN ORDER OF OUTPUT¹

Rank	Mine	County and State	Operator	Source of silver
1	Greens Creek	Juneau, AK	Kennecott Greens Creek Mining Company	Zinc ore.
2	Red Dog	Northwest Arctic, AK	Teck Cominco Alaska Inc.	Lead-zinc ore.
3	Rochester	Pershing, NV	Coeur d'Alene Mines Corp.	Gold ore.
4	Galena	Shoshone, ID	Silver Valley Resources Corp.	Silver ore.
5	Bingham Canyon	Salt Lake, UT	Kennecott Utah Copper Corp.	Copper-molybdenum ore.
6	McCoy/Cove	Lander, NV	Newmont Gold Company	Gold ore.
7	Lucky Friday	Shoshone, ID	Hecla Mining Company	Silver ore.
8	Midas ²	Elko, NV	Euro-Nevada Mining Company	Do.
9	Mission Complex ³	Pima, AZ	ASARCO Incorporated	Copper ore.
10	Carlin Mines Complex	Elko, Eureka, NV	Newmont Gold Company	Gold ore.
11	Denton-Rawhide	Mineral, NV	Kennecott Rawhide Mining Co.	Do.
12	Round Mountain	Nye, NV	Round Mountain Gold Corporation	Do.
13	Bagdad	Yavapai, AZ	Phelps Dodge Corp.	Copper-molybdenum ore.
14	Montana Tunnels	Jefferson, MT	Montana Tunnels Mining, Inc.	Zinc ore.
15	Brushy Creek	Reynolds, MO	Doe Run Resources Corp.	Lead ore.
16	Buick	Iron, MO	do.	Do.
17	Meikle/Goldstrike	Elko, NV	Barrick Gold Corporation	Gold ore.
18	Fletcher	Reynolds, MO	Doe Run Resources Corp.	Lead ore.
19	Ray	Pinal, AZ	ASARCO Incorporated	Copper ore.
20	Betze-Post/Goldstrike	Eureka, NV	Barrick Gold Corporation	Gold ore.
21	Sweetwater	Reynolds, MO	Doe Run Resources Corp.	Lead ore.
22	Cresson	Teller, CO	Cripple Creek & Victor Gold Mining Co.	Copper-molybdenum ore.
23	McLaughlin	Napa, CA	Barrick Gold Corporation	Gold ore.
24	Bald Mountain	White Pine, NV	Placer Dome Inc.	Do.
25	Castle Mountain	San Bernardino, CA	Viceroy Resources Corporation	Do.
26	Ruby Hill	Eureka, NV	Homestake Mining Company	Do.
27	Briggs	Inyo, CA	Canyon Resources Corp.	Do.
(4)	Florida Canyon	Pershing, NV	Florida Canyon Mining, Inc.	Do.

¹The mines on this list accounted for 99% of U.S. mine production in 2002.

²Formerly Ken Snyder.

³Includes Eisenhower, Mission, Pima, and San Xavier Mines.

⁴Production data at Florida Canyon are withheld; it is among the top silver-producing mines in the United States, but it is not shown in rank order to avoid disclosing company propriety data.

TABLE 4
U.S. EXPORTS OF SILVER, BY COUNTRY¹

Year and country	Silver ores and concentrates		Bullion		Doré		Total	
	Silver content (kilograms)	Value (thousands)	Silver content (kilograms)	Value (thousands)	Silver content (kilograms)	Value (thousands)	Silver content (kilograms)	Value (thousands)
2001	239,000	\$64,200	707,000	\$96,300	18,200	\$2,640	963,000	\$163,000
2002:								
Antigua and Barbuda	--	--	29	5	--	--	29	5
Armenia	--	--	93	14	--	--	93	14
Canada	--	--	14,400	2,710	39	5	14,500	2,710
Dominican Republic	4	11	71	13	--	--	75	24
Germany	--	--	22	5	24	7	46	12
Hong Kong	4	3	129	24	--	--	133	27
India	--	--	91	11	--	--	91	11
Ireland	--	--	67	12	--	--	67	12
Italy	--	--	16,600	2,060	--	--	16,600	2,060
Japan	87	39	14,400	2,730	--	--	14,500	2,770
Mexico	230,000	56,500	126,000	22,600	--	--	356,000	79,100
Netherlands	120	29	55	10	--	--	175	39
Netherlands Antilles	--	--	48	9	--	--	48	9
Singapore	--	--	296	42	--	--	296	42
Sri Lanka	--	--	51	11	--	--	51	11
Switzerland	--	--	--	--	22,600	3,350	22,600	3,350
Taiwan	--	--	25	6	--	--	25	6
Trinidad and Tobago	--	--	--	--	6	3	6	3
United Kingdom	51	16	452,000	67,600	--	--	452,000	67,600
Venezuela	--	--	29	5	--	--	29	5
Total	230,000	56,600	624,000	97,900	22,700	3,360	877,000	158,000

-- Zero.

¹Data are rounded to no more than three significant digits; may not add to totals shown.

Source: U.S. Census Bureau.

TABLE 5
U.S. EXPORTS OF SILVER, BY COUNTRY¹

Year and country	Other unwrought silver		Metal powder		Silver nitrate		Semimanufactured forms ²		Waste and scrap	
	Gross weight (kilograms)	Value (thousands)	Gross weight (kilograms)	Value (thousands)	Gross weight (kilograms)	Value (thousands)	Gross weight (kilograms)	Value (thousands)	Gross weight (kilograms)	Value (thousands)
2001	57,900	\$11,900	192,000	\$37,900	143,000	\$17,900	204,000	\$43,100	1,810,000	\$426,000
2002:										
Armenia	459	115	--	--	--	--	372	66	--	--
Australia	--	--	--	--	20,400	2,430	326	56	155	32
Austria	--	--	17	3	--	--	24	4	--	--
Belgium	45	9	16,200	2,670	10	3	1,440	262	199,000	37,000
Brazil	--	--	--	--	19	4	1,730	293	6,340	639
Canada	16,000	6,350	9,900	1,760	54,000	5,620	103,000	17,300	660,000	155,000
Chile	--	--	--	--	--	--	76	13	--	--
China	--	--	1,030	185	3	3	606	112	204,000	29,200
Colombia	--	--	235	40	--	--	81	16	22	3
Czech Republic	--	--	--	--	--	--	280	48	--	--
Dominican Republic	916	202	--	--	--	--	1,330	233	--	--
Finland	--	--	2,260	419	--	--	38	6	--	--
France	26	5	14,200	2,400	--	--	6,220	1,190	23	3
Germany	366	84	31,700	5,400	59	15	7,690	1,370	153,000	29,800
Hong Kong	959	256	21,900	3,780	26	5	6,490	1,160	331	61
India	193	48	106	20	--	--	333	59	25,500	3,320
Indonesia	--	--	--	--	--	--	20	3	172	22
Ireland	--	--	6,080	1,400	6	4	552	99	5	11
Israel	29	6	--	--	232	16	279	47	614	80
Italy	52	18	64,000	12,000	--	--	2,180	391	306,000	47,600
Jamaica	150	45	--	--	--	--	--	--	--	--
Japan	201	93	22,900	3,970	91	19	54,400	9,230	134,000	19,500
Korea, Republic of	7,710	1,440	20,600	3,620	297	20	34,400	6,000	90	143
Lebanon	--	--	809	132	--	--	--	--	--	--
Luxembourg	--	--	--	--	--	--	175	32	--	--
Malaysia	--	--	--	--	--	--	219	41	63	8
Mexico	4,550	1,000	16,700	2,840	4,730	1,100	15,200	2,910	1,260	175
Netherlands	133	42	1,710	291	4	8	6,080	947	2,960	567
Netherlands Antilles	205	48	--	--	--	--	--	--	3	4
New Zealand	--	--	108	18	--	--	540	93	--	--
Niger	--	--	665	121	--	--	--	--	--	--
Peru	--	--	36	6	--	--	89	12	--	--
Philippines	--	--	829	139	--	--	879	151	--	--
Poland	--	--	--	--	--	--	2,130	362	--	--
Saudi Arabia	--	--	--	--	--	--	--	--	76,100	19,900
Senegal	--	--	600	96	--	--	--	--	--	--
Singapore	14	4	2,200	385	--	--	5,750	1,050	--	--
South Africa	--	--	--	--	23	3	--	--	1,530	303
Spain	--	--	51	13	--	--	13,800	2,640	47	4
Sweden	10	8	3,280	558	--	--	87	18	214,000	26,600
Switzerland	29	26	436	90	23	5	661	122	102	90
Taiwan	70	13	76,400	13,100	492	92	7,080	1,240	710	93
Thailand	57	13	21	4	--	--	2,920	473	--	--
Trinidad and Tobago	--	--	--	--	--	--	326	76	--	--
United Kingdom	126	27	44,700	8,110	341	149	6,940	1,250	390,000	185,000
Uruguay	--	--	--	--	--	--	4,990	882	--	--
Venezuela	--	--	9	47	240	33	--	--	67	9
Other	378	113	84	16	161	29	436	85	707	151
Total	32,700	9,960	360,000	63,600	81,200	9,560	290,000	50,300	2,380,000	555,000

-- Zero.

¹Data are rounded to no more than three significant digits; may not add to totals shown.

²Containing 99.5% or more by weight of silver.

Source: U.S. Census Bureau.

TABLE 6
U.S. IMPORTS FOR CONSUMPTION OF SILVER, BY COUNTRY¹

Year and country	Silver ores and concentrate:		Ash and residues		Bullion		Doré		Total	
	Silver content (kilograms)	Value (thousands)	Silver content (kilograms)	Value (thousands)	Silver content (kilograms)	Value (thousands)	Silver content (kilograms)	Value (thousands)	Silver content (kilograms)	Value (thousands)
2001	7,550	\$2,750	38,000	\$6,390	2,940,000	\$425,000	151,000	\$25,800	1,110,000	\$159,000
2002:										
Argentina	--	--	327	893	--	--	--	--	327	893
Australia	--	--	7,080	504	--	--	--	--	7,080	504
Belgium	--	--	--	--	3,440	504	--	--	3,440	504
Brazil	--	--	15	53	--	--	--	--	15	53
Canada	4,620	2,780	18,200	2,680	1,520,000	229,000	437	70	1,540,000	235,000
Chile	--	--	--	--	72,500	10,600	--	--	72,500	10,600
China	--	--	--	--	72,000	10,200	--	--	72,000	10,200
Colombia	--	--	--	--	1,520	226	2,180	330	3,690	555
Dominican Republic	--	--	784	535	--	--	--	--	784	535
Ecuador	--	--	(2)	19	--	--	--	--	(2)	19
France	--	--	--	--	287	52	(2)	8	287	60
Germany	--	--	(2)	10	2,540	374	--	--	2,540	384
Honduras	--	--	--	--	--	--	23	3	23	3
Hong Kong	--	--	--	--	20,000	3,020	--	--	20,000	3,020
India	--	--	--	--	627	92	--	--	627	92
Italy	--	--	--	--	14	5	271	45	286	50
Japan	--	--	2	200	--	--	--	--	2	200
Korea, Republic of	--	--	(2)	18	--	--	--	--	(2)	18
Mexico	56,400	10,300	9,160	1,460	2,110,000	306,000	13,700	3,970	2,190,000	321,000
Panama	--	--	12	636	560	74	--	--	572	709
Peru	--	--	--	--	200,000	30,000	--	--	200,000	30,000
Poland	--	--	--	--	18,000	2,540	--	--	18,000	2,540
Saint Vincent and the Grenadines	--	--	11	7	--	--	--	--	11	7
United Kingdom	--	--	27,900	4,600	--	--	--	--	27,900	4,600
Total	61,000	13,100	63,500	11,600	4,020,000	593,000	16,600	4,430	4,160,000	622,000

-- Zero.

¹Data are rounded to no more than three significant digits; may not add to totals shown.

²Less than 1/2 unit.

Source: U.S. Census Bureau.

TABLE 7
U.S. IMPORTS FOR CONSUMPTION OF SILVER, BY COUNTRY¹

Year and country	Other unwrought silver		Metal powder		Silver nitrate		Semimanufactured forms ²		Waste and scrap	
	Gross weight (kilograms)	Value (thousands)	Gross weight (kilograms)	Value (thousands)	Gross weight (kilograms)	Value (thousands)	Gross weight (kilograms)	Value (thousands)	Gross weight (kilograms)	Value (thousands)
2001	249,000	\$44,800 ^r	24,500 ^r	\$6,250 ^r	26,000	\$1,490	154,000	\$21,600	1,110,000	\$159,000
2002:										
Australia	--	--	--	--	--	--	100	8	31,000	1,250
Belgium	--	--	--	--	--	--	--	--	1,040	150
Brazil	17	3	--	--	--	--	182,000	22,900	562	944
Canada	33,000	5,040	250	50	--	--	28,700	4,000	278,000	48,400
China	--	--	31	7	--	--	34	7	4,750	774
Colombia	--	--	--	--	--	--	--	--	713	59
Costa Rica	--	--	--	--	--	--	--	--	17,000	1,300
Dominican Republic	--	--	--	--	--	--	--	--	3,420	2,240
Finland	--	--	--	--	--	--	--	--	31	712
France	3,510	596	1,560	408	--	--	2,330	463	22	14
Germany	--	--	3,800	702	27	14	28,400	3,580	77,300	9,210
India	191	47	23	5	--	--	7,840	1,530	--	--
Ireland	--	--	--	--	--	--	--	--	284	64
Israel	--	--	5	4	--	--	25	46	6,730	40
Italy	255	142	--	--	--	--	5,700	722	69,300	2,220
Jamaica	--	--	--	--	--	--	--	--	1,140	14
Japan	118	66	5,660	1,220	40	13	6,250	1,810	43,400	3,100
Jordan	--	--	--	--	--	--	--	--	639	200
Korea, Republic of	25	5	38	11	--	--	12,800	1,140	5,920	1,420
Malaysia	--	--	--	--	--	--	--	--	5,990	184
Mexico	225,000	32,700	--	--	--	--	644	112	40,100	31,800
Morocco	--	--	--	--	--	--	--	--	177	23
Netherlands	--	--	--	--	--	--	77	27	6	85
New Zealand	--	--	--	--	--	--	--	--	128	623
Niger	--	--	--	--	--	--	(3)	5	--	--
Panama	--	--	--	--	--	--	--	--	422	2,440
Peru	196	109	182	30	--	--	--	--	16	37
Philippines	--	--	--	--	--	--	--	--	57,200	1,390
Poland	--	--	--	--	--	--	11,000	910	--	--
Portugal	--	--	--	--	--	--	--	--	7,830	54
Singapore	--	--	--	--	--	--	--	--	9,680	2,020
South Africa	--	--	--	--	--	--	--	--	20,100	495
Sweden	--	--	25	4	--	--	--	--	256	153
Switzerland	--	--	290	48	--	--	17	9	--	--
Taiwan	--	--	90	19	--	--	2,090	144	27	46
Thailand	--	--	--	--	--	--	59	8	--	--
United Kingdom	148	10	161	33	505	76	1,360	298	132,000	5,230
Other	11	13	--	--	--	--	128	49	414	758
Total	263,000	38,700	12,100	2,540	572	103	289,000	37,800	816,000	117,000

-- Zero.

¹Data are rounded to no more than three significant digits; may not add to totals shown.

²Containing 99.5% or more by weight of silver.

³Less than 1/2 unit.

Source: U.S. Census Bureau.

TABLE 8
SILVER: WORLD MINE PRODUCTION, BY COUNTRY^{1,2}

(Metric tons)

Country	1998	1999	2000	2001	2002 ^c
Algeria ^c	2	1	1	2 ^{r,3}	1
Argentina	36	74	78	153	126 ³
Australia	1,474	1,720	2,060	2,100 ^e	2,077 ³
Bolivia	404	422	434	408	450 ³
Brazil ^d	34	42	41	46 ^r	46
Bulgaria ^c	24 ³	25	25	25	25
Burma	3	4	2	2	2
Canada	1,196	1,174 ^r	1,212	1,265 ^r	1,344 ³
Chile	1,340	1,381 ^r	1,242	1,348 ^r	1,350
China ^c	1,300	1,320	1,600	1,910 ^r	2,500
Colombia	5	8	8	7	7 ³
Congo (Kinshasa) ^c	-- ^{r,3}	-- ^r	-- ^r	-- ^r	--
Costa Rica ^c	(5) ³	(5)	(5)	(5)	(5)
Dominican Republic	7	3	--	--	--
Ecuador ^c	2	2	2	2	2
El Salvador	(5)	(5)	--	--	--
Fiji	2	2	1	-- ^r	--
Finland	30 ^e	32 ^e	25 ^r	23	30
France	1	1	1	1 ^e	1
Ghana	4 ^e	4 ^e	2 ^r	2 ^r	6 ³
Greece	45 ^e	46	37	62 ^r	75 ³
Honduras	43	38	32	47 ^r	53 ³
India	52	54 ^e	40	53	52 ³
Indonesia	349	288	256	348 ^r	350
Iran ^c	19	21	22	22	23
Ireland	13 ^e	15	25	19 ^r	5
Italy ⁶	10	10	4	4	4
Jamaica	--	--	--	(5)	(5)
Japan	94	94	104	80	81 ³
Kazakhstan	726	905	927	982	892 ³
Korea, North ^c	50	40	40	40	40
Korea, Republic of ⁷	339	489	591	665 ^r	650
Macedonia ^c	20	22	20	15	10
Malaysia	7	4	(5)	(5)	-- ³
Mali ^c	1	1	1	2 ^r	3
Mexico	2,686	2,467	2,620	2,760	2,748 ³
Mongolia ^c	20	20	25	27	27 ³
Morocco	307	278	289	281 ^r	277 ³
Namibia	23	10	9	32 ^r	24
New Zealand	23	24	23 ^e	23 ^e	32
Nicaragua	4	2	2	2	3
Oman	5 ^r	3 ^r	5 ^r	3 ^r	3
Panama ^c	2	2 ³	2	2	2
Papua New Guinea	59	67	73 ^e	73 ^e	75
Peru	2,025	2,231	2,145	2,353	2,687 ³
Philippines	18	18	17 ^e	17 ^e	9
Poland	1,108	1,100	1,148 ^r	1,194 ^r	1,200 ³
Portugal	32	27	21	23 ^e	19
Romania ^c	60	50 ³	50	50	50
Russia ^c	350	375	370	380	400
Saudi Arabia	14	10	9	15 ^r	14
Serbia and Montenegro	34	8	9	6	68 ³
Solomon Islands	2	2	(5) ^e	-- ^e	--
South Africa	144	152	144	110	113 ³

See footnotes at end of table.

TABLE 8--Continued
SILVER: WORLD MINE PRODUCTION, BY COUNTRY^{1,2}

(Metric tons)

Country	1998	1999	2000	2001	2002 ^c
Spain	47	96 ^e	66	60 ^e	50
Sweden	299	284	329 ^r	306 ^r	299 ³
Tanzania	--	(6) ^r	1 ^r	7 ^r	10
Tajikistan	5	5	5	5 ^e	50
Tunisia	3	4	4	4 ^r	3
Turkey ^c	110	100	110	100	100
United States	2,060	1,950	1,980	1,740	1,420 ³
Uzbekistan	85 ^e	89	90	80 ^e	80
Zambia ⁸	8	5	5 ^e	5 ^e	7
Zimbabwe	7	5	4	3	2 ³
Total	17,200	17,600 ^r	18,400 ^r	19,300 ^r	20,000

^cEstimated. ^rRevised. -- Zero.

¹World totals, U.S. data, and estimated data are rounded to no more than three significant digits; may not add to totals shown.

²Recoverable content of ores and concentrates produced unless otherwise specified. Table includes data available through August 13, 2003.

³Reported figure.

⁴Includes the following quantities, in kilograms, identified as secondary silver: 1998--40,000; 1999-2001--50,000; and 2002--50,000 (estimated).

⁵Less than 1/2 unit.

⁶Smelter and/or refinery production.

⁷Includes production from imported ores.

⁸Year beginning April 1 of that stated.